SPECIAL OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING DECEMBER, 1920.

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[Solar Radiation Investigations Section, Washington, Feb. 2, 1921.]

For a description of instruments and exposures, and an account of the methods of obtaining and reducing the measurements, the reader is referred to this REVIEW for April, 1920, 48:225.

From Table 1 it is seen that there were but few days with clear skies at any of the stations, and the solar radiation intensities measured averaged slightly below the normal for December.

Table 2 shows a deficiency in the radiation received from the sun and sky at all three stations, although least marked at Lincoln.

For the year, Washington shows a deficiency of about 1.3 per cent of the normal, which, however, was all accumulated in the months of November and December. Madison shows almost no departure for the year, although most of the time after June 1 there was considerable excess.

A skylight polarization measurement of 71 per cent on the 16th was the only measurement made at Madison during the month. At Washington measurements of 59 per cent on the 18th, and 60 per cent on the 28th were the only two measurements obtained.

TABLE 1.—*Solar radiation intensities during December, 1920.*

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Sun's zenith distance. 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon.
	75th meridian time.	Air mass. A. M.					P. M.				Local mean solar time.
	e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Dec. 8	2.87			1.09		1.43					3.15
15	4.17	0.90	1.01	1.15		1.47					2.62
17	3.45				1.13						3.45
18	2.36		0.85	0.98							1.68
28	2.87	0.63	0.80	0.96	1.22						2.36
31	4.17				1.18						4.75
Means		(0.76)	0.89	1.04	1.18						
Departures		±0.00	±0.00	−0.01	−0.04						

Madison, Wis.

Dec. 7	2.87	0.91	1.03								3.81
16	2.26	1.06	1.16								2.87
27	1.19								0.73		1.19
Means		(0.98)	(1.10)						(0.73)		
Departures		+0.05	−0.03						−0.34		

TABLE 1.—*Solar radiation intensities during December, 1920*—Contd.

Lincoln, Nebr.

Date.	Sun's zenith distance. 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon.
	75th meridian time.	Air mass. A. M.					P. M.				Local mean solar time.
	e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal*	*mm.*
Dec. 4	3.99		1.08	1.21	1.36				1.05	0.89	4.57
14	3.45			1.17							3.15
15	2.87	1.08	1.15	1.27				1.23	1.11	1.00	2.36
16	2.62							1.13	0.81		3.00
27	0.66								1.19		0.86
30	2.74			0.96							5.56
31	4.75		0.99	1.18							7.04
Means		(1.08)	1.07	1.16	(1.36)			(1.18)	1.04	(0.94)	
Departures		+0.18	+0.02	−0.06	−0.03			−0.02	−0.04	−0.03	

Santa Fe, N. Mex.

Dec. 4	2.06					1.73	1.53	1.32	1.22	1.13	2.36
8	2.26							1.22			2.26
13	1.45		1.31	1.35							1.37
14	1.96		1.16	1.29	1.44	1.57					2.36
15	1.37		1.26								2.26
18	2.36				1.46						2.87
29	1.96	1.03	1.30	1.39							2.26
30	1.96		1.31		1.55			1.30	1.24		2.87
Means		(1.03)	1.27	1.34	1.48		(1.53)	1.28	(1.23)	(1.13)	
Departures		−0.11	+0.02	−0.02	−0.02		+0.05	−0.02	+0.02	+0.06	

* Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface.*

Week beginning—	Average daily radiation. Washington.	Madison.	Lincoln.	Average daily departure for the week. Washington.	Madison.	Lincoln.	Excess or deficiency since first of year. Washington.	Madison.	Lincoln.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Dec. 3	142	113	130	−17	−12	−43	− 898	+558	.....
10	113	90	180	−41	−35	+ 8	−1,185	+311	.....
17	114	103	149	−40	−26	−23	−1,466	+131	.....
24	139	130	193	−16	− 5	+17	−1,594	+ 89	.....

MEASUREMENTS OF THE SOLAR CONSTANT OF RADIATION AT CALAMA, CHILE.

By C. G. ABBOT, Assistant Secretary.

[Smithsonian Institution, Washington, Jan. 30, 1921.]

In continuation of preceding publications, I give in the following table the results obtained at the Montezuma station, Calama, Chile, in November, 1920, for the solar constant of radiation. The reader is referred to this REVIEW for February, August, and September, 1919, for statements of the arrangement and meaning of the table.

The transmission coefficient at 0.5 micron is not given for November 25, 26, and 27, due to the fact that not all of the data for these days have been received. No observations were made on the 28th and 29th owing to cloudiness, and the values for the 30th have not been computed.

Date.	Solar constant.	Method.	Grade	Transmission coefficient at 0.5 micron.	Humidity.			Remarks.
					$\rho/\rho_{s.c.}$	V. P.	Rel. hum.	
1920.								
A. M.	*cal.*					*cm.*	*P. ct.*	
Nov. 1	1.963	E_0	VG+	0.859	0.504	0.36	42	
2	1.958	M_2	S—	.875	.641	.19	14	
	1.953	$M_{1.5}$						
	1.956	W. M.						
3	1.951	$M_{2.5}$	S—	.872	.616	.22	23	Few clouds low in east.
	1.960	M_2						
	1.956	W. M.						
4	1.957	M_3	S—	.861	.521	.27	34	
	1.938	$M_{2.5}$						
	1.952	W. M.						
5	1.974	E_0	VG+	.868	.660	.17	18	
	1.946	$M_{2.5}$						
	1.936	M_2						
	1.951	$M_{1.5}$						
	1.950	W. M.						
6	1.940	$M_{2.5}$	S—	.878	.697	.15	12	
	1.950	M_2						
	1.955	$M_{1.5}$						
	1.948	W. M.						
7	1.952	M_2	S—	.875	.660	.19	16	
	1.941	$M_{2.5}$						
	1.945	W. M.						
8	1.951	$M_{2.5}$	S—	.873	.640	.19	18	
	1.949	M_2						
	1.950	W. M.						
9	1.948	$M_{2.5}$	S—	.873	.656	.23	17	
	1.947	M_2						
	1.944	$M_{1.5}$						
	1.947	W. M.						
10	1.953	$M_{2.28}$	S—	.872	.656	.23	15	Small patches of cirrus scattered about sky.
	1.953	M_2						
	1.940	$M_{1.45}$						
	1.949	W. M.						
11	1.956	$M_{2.19}$	S—	.872	.675	.20	15	
	1.955	M_2						
	1.952	$M_{1.5}$						
	1.955	W. M.						
	1.928	M_2	S—	0.872	0.598	0.19	20	
	1.944	$M_{2.5}$						
	1.938	W. M.						
13	1.950	E_0	E+	.872	.617	.23	20	
	1.950	M_3						
	1.949	M_2						
	1.952	$M_{1.5}$						
	1.950	W.M.						
14	1.938	$M_{1.55}$	S—	.858	.665	.28	21	Cirri scattered about sky.
	1.946	$M_{1.44}$						
	1.942	W. M.						
15	1.964	E_0	E—	.850	.538	.24	25	Some cirri in east.
P. M.								
16	1.918	$M_{2.5}$	S—	.854	.462	.37	25	Cirri scattered about sky. None near sun.
	1.929	M_2						
	1.925	W. M.						
17	1.966	$M_{1.01}$+	S—	.859	.688	.34	18	Cirri in north and east, preventing earlier observations.
	1.962	$M_{1.01}$—						
A. M.								
18	1.964	W. M.						Cirri prevented long method.
	1.947	M_3	S—	.866	.485	.28	31	
	1.941	$M_{2.5}$						
	1.936	M_2						
	1.942	W. M.						
P. M.								
21	1.957	$M_{1.02}$	S—	.875	.818	.18	8	Clouds scattered aroun sky. None near sun.
A. M.								
22	1.928	M_2	S—	.874	.667	.33	26	Low clouds in east preventing earlier observations.
	1.953	$M_{1.5}$						
	1.945	W. M.						
23	1.955	$M_{1.5}$	S—	.874	.747	.27	17	Patches of cirrus scattered about sky.
	1.958	$M_{1.46}$						
	1.956	W. M.						
24	1.937	M_3	S—	.875	.656	.17	18	
	1.931	$M_{2.5}$						
	1.935	W. M.						
P. M.								
25	1.939	$M_{2.12}$	S—	.....	.690	.23	11	
	1.953	M_2						
	1.949	W. M.						
A. M.								
26	1.939	M_3	S—	.....	.702	.20	18	
	1.935	$M_{2.5}$						
	1.938	W. M.						
27	1.935	$M_{2.19}$	S—	.....	.667	.26	19	
	1.939	M_2						
	1.938	W. M.						